

Appendix A

## **Model Abstract**

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**Name:** Wellhead Gas Productive Capacity

**Acronym:** GASCAP

**Description:** GASCAP estimates the historical wellhead productive capacity of natural gas for the lower 48 States and projects the productive capacity for 3 years. *The Short-Term Energy Outlook* (STEO) output for *low*, *base*, and *high* cases is used to estimate the number of active rigs and oil and gas well completions. The projected oil production (which is assumed to be producing at capacity) is used to estimate the oil-well gas production using a constant gas-oil ratio. The gas demand is also taken from STEO. The difference between demand and oil-well gas production is assumed to be the gas-well gas demand and the production as long as capacity exceeds demand.

**Purpose:** GASCAP is used to project the natural gas wellhead productive capacity for the lower 48 States. It also allows quantification of the available productive capacity and the projected capacity under differing future scenarios.

**Date of Last Model Update:** 1996

**Part of Another Model:** No

**References to Any Other Models:** None

**Documentation reference:** *Wellhead Gas Productive Capacity Model* (GASCAP) Documentation DOE/EIA-M052, March 1995

### Official Model Representatives:

- **Office:** Oil and Gas
- **Division:** Reserves and Production
- **Model Contacts:** John H. Wood, James N. Hicks, Hafeez Rahman, Velton T. Funk
- **Telephone:** 214-720-6150

**Archive Media and Installation Guides:** Cartridge tape available from NEIC for GASCAP94, for the report *Natural Gas Productive Capacity for the Lower 48 States 1986 through 1998*, DOE/EIA-0542(97/2).

**Energy System Described:** GASCAP measures and predicts wellhead natural gas productive capacity.

### Coverage:

- **Geographic:** Lower-48 natural gas producing States
- **Time Unit/Frequency:** Evaluates 13 years of historical data and project productive capacity for 3 years.
- **Products:** Natural gas
- **Economic Sectors:** Not applicable

### Modeling Features:

- **Model Structure:** The model consists of a series of Statistical Analysis System (SAS) procedures utilizing a modified rate of gas production versus cumulative gas production (Rate-cum) equation.
- **Modeling Techniques:** SAS, utilizing the least squares, nonlinear regression procedure (NLIN) with the Marquardt computational method, was used to fit hyperbolic equations to the data.
- **Special Features:** Estimates conventional and coalbed gas-well gas productive capacity separately.

### Non--DOE Input Variables and Sources:

- Dwight's EnergyData Inc, Richardson, TX, Oil and Gas Reports
  - State monthly natural gas production by well
- Baker Hughes Incorporated
  - Number of active rotary rigs and number of active rotary gas rigs
- American Petroleum Institute
  - Drilling statistics monthly tapes

### DOE Data Input Variables and Sources:

- *Natural Gas Annual*
  - Marketed gas production by State
  - Gross gas production by State
  - Oil-well gas production by State
- *Natural Gas Monthly*
  - Marketed production of natural gas by State
- *Short Term Energy Outlook*

- Dry gas production forecast
- Oil and gas price forecasts
- *Petroleum Supply Annual*
- Crude oil production

**Computing Environment:**

**Main Frame**

- **Hardware:** IBM 3090E Model 400
- **Operating System:** MVS/XA
- **Languages:** FORTRAN / SAS / COBOL
- **Memory requirement:** 1500K
- **Storage requirement:** 1200 tracks of 3380 disk space
- **Estimated run time:** 4 hours CPU time

**Personal Computer**

- **Hardware:** Compaq Deskpro 386/20

- **Operating System:** MS DOS
- **Software:** LOTUS 123 / EXCEL / ARBITER / HARVARD GRAPHICS
- **Memory requirement:** 2000K
- **Storage requirement:** 10 Mb hard disk space
- **Estimated run time:** 1 hour

**Independent Expert Reviews Conducted:**

- Report of findings and Recommendations  
Paul R. Carpenter, Ph.D.  
Brattle/IRI, Inc.  
26 June 1995
- Model Quality Audit  
Allied Technology Group, Inc.  
Prepared by QuanTech, Inc.  
29 February 1996